



WEEKEND VS. MEDIUM STAY TOURISM

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Abstract *Estimated profit is extremely important for any business. Tourism companies can be focused on weekend or medium stay tourism. This paper aims to highlight advantages and disadvantages of each. The study aims also to highlight the usefulness of the Monte Carlo method for estimating profit and the probability of obtaining it. The paper presents a simplified example to estimate profit. It makes an analysis on a single hotel unit, once considered for weekend tourism, then considered for medium stay tourism. In both cases, the profit will be associated with the probability of achieving it.*

Key words:

Profit, Monte Carlo, weekend stays, medium stays, tourism

JEL Codes:

C15

1. Introduction

Hotel units that are highly seasonal permit no missteps. It is difficult to predict the evolution of profit affected by seasonality, this will depend on many factors such as the level of confidence in the state of the national economy, consumer behavior, purchasing power, trade policies and last but not least, weather. Few degrees plus or minus in temperature can generate significant changes in sales.

Strategy to promote / sell tourism products with high seasonality is very different compared to those that sell relatively constant during the year. For seasonal tourism an unrealized sale is a sale lost forever and can't be recovered the next month.

2. Study method

Monte Carlo simulation is a method for *iteratively* evaluating a deterministic model using sets of random numbers as inputs. This method is often used when the model is complex, nonlinear, or involves more than just a couple uncertain parameters. A simulation can typically involve *over 10,000 evaluations* of the model, a task which in the past was only practical using super computers.

Monte Carlo simulation supplies the decision-maker with a range of possible outcomes and the probabilities that will occur for any choice of action. It shows the extreme possibilities—the outcomes of going for broke and for the most conservative decision—along with all possible consequences for middle-of-the-road decisions.

The technique was first used by scientists working on the atom bomb; it was named for Monte Carlo, the

Monaco resort town renowned for its casinos. Since its introduction in World War II, Monte Carlo simulation has been used to model a variety of physical and conceptual systems.

The Monte Carlo method is just one of many methods for analyzing uncertainty propagation, where the goal is to determine how *random variation, lack of knowledge, or error* affects the *sensitivity, performance, or reliability* of the system that is being modeled.

Monte Carlo simulation is categorized as a sampling method because the inputs are randomly generated from *probability distributions* to simulate the process of sampling from an actual *population*. So, we try to choose a distribution for the inputs that most closely *matches data we already have*, or best represents our *current state of knowledge*. The data generated from the simulation can be represented as probability distributions (or histograms) or converted to *error bars, reliability predictions, tolerance zones, and confidence intervals*. (Figure 1).

The steps in Monte Carlo simulation corresponding to the uncertainty propagation shown in Figure 1 are fairly simple, and can be easily implemented in Excel for simple models. All we need to do is follow the five simple steps listed below:

Step 1: Create a parametric model, $y = f(x_1, x_2, \dots, x_n)$.

Step 2: Generate a set of random inputs, $x_{i1}, x_{i2}, \dots, x_{in}$.

Step 3: Evaluate the model and store the results as y_i .

Step 4: Repeat steps 2 and 3 for $i = 1$ to n .

Step 5: Analyze the results using histograms, summary statistics, confidence intervals, etc.

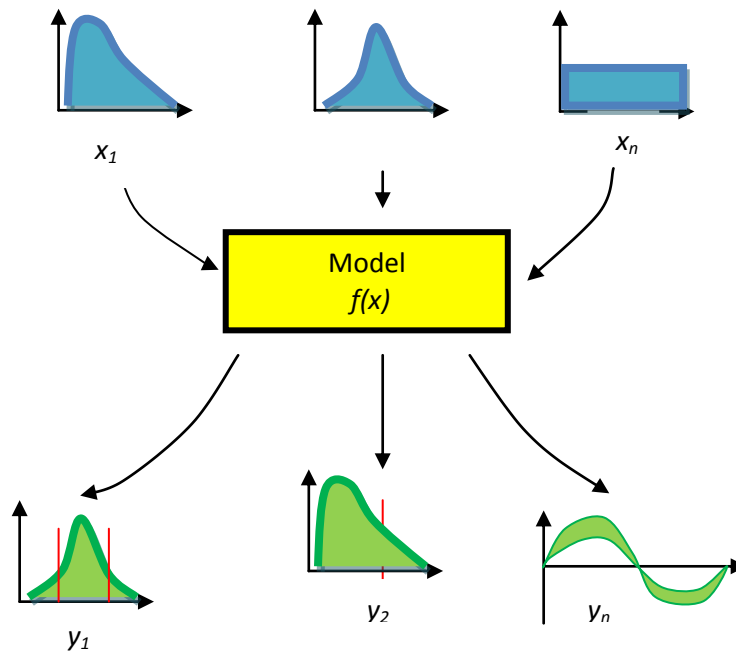


Figure 1. Schematic showing the principal of stochastic uncertainty propagation (The basic principle behind Monte Carlo simulation)

The Scenario: Company ABC wants to know how profitable it will be to choose a weekend tourism or a medium stay tourism, realizing there are many uncertainties associated with market size, expenses, and revenue.

The Method: Use a Monte Carlo Simulation to estimate profit and evaluate risk.

Step 1: Creating the Model

We are going to use a top-down approach to create the sales forecast model, starting with:

$$\text{Profit} = \text{Income} - \text{Expenses}$$

Both income and expenses are uncertain parameters, but we aren't going to stop here, because one of the purposes of developing a model is to try to break the problem down into more fundamental quantities. Ideally, we want all the inputs to be independent.

We'll say that *Income* comes solely from the number of tourists (T) multiplied by the price per occupied seats (P) resulting from an individual purchase of a gadget, so $\text{Income} = T \cdot P$. The *profit per occupied seats* takes into account the sale price (P), and other facilities offered.

We take the number of sales as one of the primary variables. The number of sales per month is the number of seats (L) multiplied by the occupancy rate (R).

So our final equation for *Income* is:

$$\text{Income} = L \cdot R \cdot P$$

We'll consider the *Expenses* to be a combination of fixed overhead (H) plus the total cost of accommodation. C represents the cost of a daily single tourist accommodation.

Our final model for Company ABC's profit forecast is:

$$\text{Profit} = L \cdot R \cdot P - (H + L \cdot R \cdot C)$$

For a comparative analysis weekend vs. medium stay tourism, the Monte Carlo method can be used. This type of analysis can be used regardless of the type or location of the hotel unit.

3. Hypothesis

We use the following hypothesis:

- analysis is done on a one month period (8 days weekend and 22 working days);
- $L=100$;
- the occupancy rate:
 - weekend $R=0,9 \pm 10\%$;
 - medium stays $R=\{0,2; 0,3; 0,4; 0,5\} \pm 10\%$
- the price per occupied seat:
 - weekend $P=120$ m.u.;
 - medium stays $P=100$ m.u.
- the cost per occupied seat:
 - weekend $C=60 \pm 10\%$ m.u.;
 - medium stays $C=50 \pm 10\%$ m.u.
- fixed overhead $H=1000$ m.u./day;
- uniform distribution law is used.

4. Results

Step1: Parametric model was created, we have established limits for each parameter variation and the variation law admitted uniform distribution (the worst case scenario).

Step2: Generate a set of random inputs using Excel spreadsheet, (Data-Data Analysis- Random number generation), figure 2.

Step 3: Analyze the results. For each case we have to order the results by profit, establish grouping intervals, data groups, the density of probability and the distribution law, figure 3,

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	A	B	C	D	E	F	G	H
1	R (Rand)	C (Rand)	L	P	H	Income	Expenses	Profit
2	0,18-0,22	45-55	100	100	1000	(monthly)		
3	0,214639	52,85852	100	100	1000	64392	64036	355
4	0,219707	46,11362	100	100	1000	65912	60394	5518
5	0,198509	50,2089	100	100	1000	59553	59901	-348
6	0,198107	48,8731	100	100	1000	59432	59046	386
7	0,217214	47,42927	100	100	1000	65164	60907	4257
8	0,20844	50,92303	100	100	1000	62532	61843	689
9	0,20239	49,5323	100	100	1000	60717	60074	642
10	0,197873	51,70278	100	100	1000	59362	60692	-1330
11	0,218782	50,38957	100	100	1000	65635	63073	2562
12	0,215917	46,15024	100	100	1000	64775	59894	4881
13	0,219133	46,1536	100	100	1000	65740	60341	5399
14	0,203018	51,0387	100	100	1000	60905	61085	-180
15	0,198542	46,44047	100	100	1000	59563	57661	1901
16	0,207047	50,84155	100	100	1000	62114	61580	534
17	0,186446	48,4904	100	100	1000	55934	57122	-1189

Figure 2 Generate a set of random inputs

	A	B	C	D	E
1	nr.	x_i	n_i	$f_n(x)$	$F_n(x)$
2	1	8000	180	0,018	0,018
3	2	10000	1200	0,12	0,138
4	3	12000	1600	0,16	0,298
5	4	14000	1810	0,181	0,479
6	5	16000	2070	0,207	0,686
7	6	18000	1340	0,134	0,82
8	7	20000	1160	0,116	0,936
9	8	22000	540	0,054	0,99
10	9	24000	100	0,01	1
11		Σ	10000		

Figure 3 Distribution law for R=0,3

Medium stay tourism

Calculating the distribution law for the cases studied has allowed us to determine the daily evolution of profit, figure 4. In figure 5 the Monte Carlo simulation results are shown.

The graphs shown in Figure 5 easily determine the probability of profit. Table 5 shows the probability of obtaining profit over a certain threshold.

Table 1. Input values for medium stay tourism

Input Values (input)	Case	Nominal	Min	Max	Stochastic
Number of seats (L)		100			
Price per occupied bed (P)		100			
Cost per occupied bed (C)		50	45	55	50,07
Occupancy rate (R)	1	0,2	0,18	0,22	0,2003
	2	0,3	0,27	0,33	0,3006
	3	0,4	0,36	0,44	0,4009
	4	0,5	0,45	0,55	0,5008
Overhead per day (H)		1000			

Table 2. Results for medium stay tourism

Results (calculations)	Case	Deterministic	Stochastic
Projected Monthly Profit:	1	0	-0.9
	2	15000	15208
	3	30000	30123
	4	45000	44986

Weekend tourism

Table 3. Input values for weekend tourism

Input Values (input)	Weekends				
	Nominal	Min	Max	Stochastic	
Number of seats (L)	100				
Price per occupied bed (P)	120				
Cost per occupied bed (C)	60	54	66	60,07	
Occupancy rate (R)	0,9	0,81	0,99	0,989	
Overhead per day (H)	1000				
Input Values (input)	Working days				
	Nominal	Min	Max	Stochastic	
Number of seats (L)	100				
Price per occupied bed (P)	100				
Cost per occupied bed (C)	50	45	55	49,88	
Occupancy rate (R)	0,1	0,09	0,11	0,10008	
Overhead per day (H)	1000				

Table 4. Results for weekend tourism

Results (calculations)		Deterministic	Stochastic
Projected Monthly Profit:	Working days	-11000	-10952
Projected Monthly Profit:	Weekends	35200	35117
Projected Monthly Profit:	Total	24200	24165

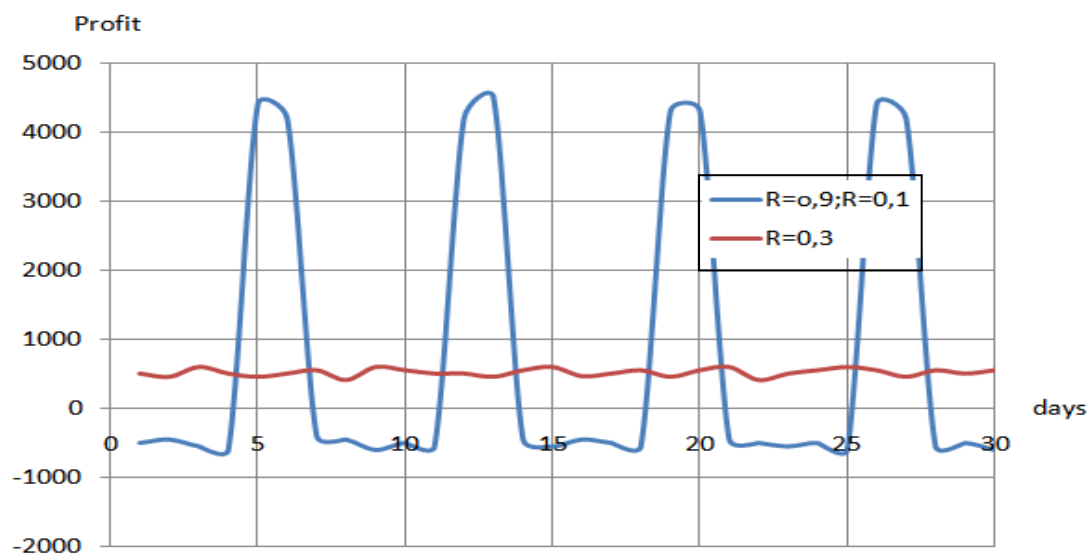


Figure 4. Daily evolution of profit

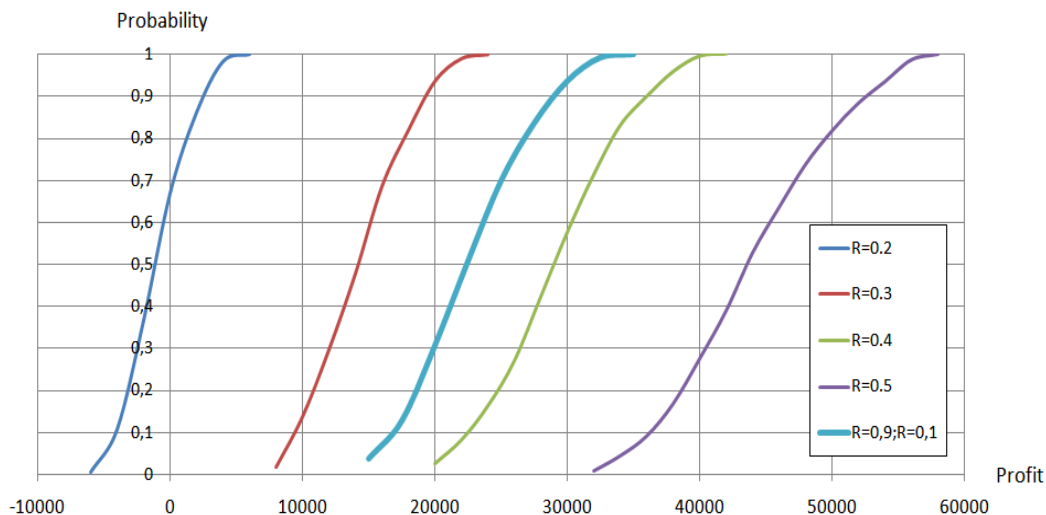


Figure 5. Histogram of Monte Carlo Simulation Results

Table 5. Profit related to the occupancy rate

Profit	Medium stays R=0,2	Medium stays R=0,3	Medium stays R=0,4	Medium stays R=0,5	Weekend stays
>0	33%	100%	100%	100%	100%
>10000	0%	85%	100%	100%	30%
>20000	0%	6%	100%	100%	70%
>30000	0%	0%	58%	100%	6%
>40000	0%	0%	0%	72%	0%

5. Conclusions

- profit increases with occupancy rate;
- in the case study probability of making profit is $p=0,33$ for $R=0,2$; in other cases the probability of making profit is $p=1$;
- profit in the case of weekend tourism cannot exceed medium stay with occupancy rate $R=0,35$;
- to achieve the highest profit probability, the focus of tourism stay with occupancy rate greater than 0,35 is recommended.

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